Rice University
Department of Psychology

PSYC 480/640: Medical Human Factors Spring 2012

T-Th 10:50-12:05 SH 462

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Office Hours Tuesday 1:30-2:30 or by appointment

Required Texts:

None – Assigned readings (shown on the attached sheets) will be posted on Owlspace.

Class	Week	Topic	Exercise
1	1/10	Introductions, Class logistics, and motivations for the course	
2	1/12	Errors in Medicine: Classification and taxonomy	
3	1/17	Diagnostic errors	Exercise 1: Self Diagnosis
4	1/19	Errors in Medicine: Case studies	
5	1/24	Human Capabilities: Visual perception and medicine. Sleep deprivation	
6	1/26	Device Design: Usable device interfaces	Exercise 2: Drip dosing interface design
7	1/31	Device Design: Infusion pumps	
8	2/2	Device Design: Surgical robotics	Exercise 3: International dosage guide design
9	2/7	Device Design: International design for extreme environments *Guest Lecture: Dr. Penni Hicks, Director of Beyond Traditional Boarders*	
10	2/9	Device Design: Case Study *Guest Lecture Yared Akalou, CareFusion*	
11	2/14	Home Medicine: medical devices *Guest lecture on Blue Box – Nithan Rajan, Director of Product Development, Abranson Center for the Future of Health*	
12	2/16	Home Medicine: Medical Care in Space *Guest Lecture: Vicky Byrne, Wyle Integrated Science and Engineering*	
13	2/21	Home Medicine: Walk up and use devices	Exercise 4: Medical device design
14	2/23	Informatics: Consumer health information acquisition **Exam 1 issued**	Exercise 5: Information accuracy

15	2/28	***No class - Spring Break***	
16	3/1	***No class - Spring Break***	
17	3/6	Electronic heath records *Presentation topics due*	
18	3/8	Simulators **Exam 1 Due**	Exercise 6: Surgical simulation enhancements
19	3/13	Medication: Drug delivery systems	
20	3/15	Medication: Prescriptions	Exercise 7: Prescription bottle design
21	3/20	Tele-medicine	
22	3/22	***No class – Midterm Recess***	
23	3/27	Human Factors in Surgery	
24	3/29	Macro-ergonomics	
25	4/3	Special topics: transportation and military medicine	
26	4/5	Emergency room medicine **Exam 2 issued**	
27	4/10	Presentations	
28	4/12	***No Class instructor at SWPA***	
29	4/17	Presentations	
30	4/19	Presentations **Exam 2 due**	

Examinations: There will be 2 examinations, but no Final Exam. The 2 take home exams will be closed book/closed note and may cover any of the material assigned up to that point. This includes material from any of the assigned readings, my lecture notes, Lab tours, Lab exercises and presentations that other students have given.

Presentations: Each student will be required to give one 10 minute presentation during the course of the semester on a specific medical interface that interests them. You will select a medical device or system and describe the device or system and detail its human factors deficiencies or its superior design features. Your device will be likely drawn from the medical literature or the popular press (backed up by academic papers of course). You will also be required to make design suggestions that could have prevented the documented adverse consequences, or detail the design considerations that went into the device to eliminate these kinds of deficiencies. No report is required for this presentation, but you must supply me with a copy of the presentation material after the talk. Presentation topics are due on 3/6.

Class Exercises: Over the course of the semester I will assign 7 exercises. Some of these will be design exercises, and others will be more analytic in nature. Most of these will be started in

class, but will then require some out of class work. Six of these will be individual exercises and one will be team based. There are no make-ups on these exercises. We will share and discuss these exercises in class and talk about the different solutions obtained.

Participation: A good deal of this class will entail open discussions of human factors issues of medical human factors, as well as discussions of student presentations and lab exercises. Active, thoughtful participation is expected from every student

Evaluation:

Exam 1	25%
Exam 2	25%
In class exercises:	35% (5% each)
Presentation	10%
Participation	5%

Disabilities:
If you have a documented disability that requires accommodation, please let me know so we can confidentially discuss your needs. You will also need to register with the Disability Support Services Office.

Honor System Policy:
As with all endeavors at Rice, you are expected to adhere to the Honor Code and follow the guidelines given in the Blue Book. Exams are given under the honor system. Students are encouraged to seek input from other students on their presentation selection and homework, but each student is expected to perform the actual work themselves. Students are encouraged to bring any concerns involving academic integrity to the attention of the instructor.

Medical Human Factors Readings

Lecture 1
- To err is human: Building a safer healthcare system: executive summary
- Institute of medicine medical error figures are not exaggerated
- Five years after To Err is Human. What have we learned?
- Consumer views of hospital errors in the USA

Lecture 2
- The Causes of human error in medicine
- A cognitive taxonomy of medical errors
- Should we consider non-compliance a medical error?
- Medical errors and human factors engineering: where are we now?

Lecture 3
- Diagnostic error in internal medicine
- Diagnostic errors in three medical eras: a necropsy study
- Will you be misdiagnosed? How diagnosis errors happen

Lecture 4
- Set phasers on stun: Set phasers on Stun
- Preventable anesthesia mishaps: a study of human factors
- Safer technology: solutions or experiments?
- Set Phasers on Stun: Double vision
- The Atomic Chef: The Embryo Imbroglio
- The Atomic Chef: Safer than safe

Lecture 5

- Impact of extended duration shifts on medical errors, adverse events and attentional failures
- Neurobehavioral performance of residents after heavy night call vs after alcohol ingestion
- The importance of perception research in medical imaging
- Using eye movements to study visual search and improve tumor detection
- Vision enhancement system for detection of oral cavity neoplasia
- Perceptual enhancement of tumor targets in chest xray images

Lecture 6

- Injury and death associated with hospital bed side-rails
- Medical device development: the challenge for ergonomics
- Incorporating human factors into the design of medical devices (letter to the editor)
- Users as designers: how people cope with poor HCI design in computer based medical devices
- Safe medical devices for children : executive summary
- Do it by Design: an introduction to human factors in medical devices

Lecture 7

- A usability evaluation of an infusion pump by nurses using a patient simulator
- A user centered evaluation of three intravenous infusion pumps
- Technology characteristics predicating end user acceptance of smart intravenous pumps
- Programming errors contribute to death from patient controlled analgesics case report and estimate of probability

Lecture 8

- State of the art in surgical robotics: clinical applications and technology challenges
- A steady hand robotic system for microsurgical augmentation

Lecture 9

- Diagnostic lab in a backpack
- Reducing the risk of unsafe injections in immunization programmes
- Use of Soloshot autodestruct syringes compared with disposable syringes in a national immunization campaign in Indonesia

Lecture 10

- Industrial Design and Human Factors: Design Synergy for Medical Devices

Lecture 11

- Submaximal decision theory and health resource conservation: the example of congestive heart failure
- Wearable medical devices for tele-home health
- Learning to use a home medical device: mediating age-related differences with training

Lecture 12

- Medical care systems for long duration space missions
- Monitoring and telemedicine support in remote environments

Lecture 13

- Comparison of naive sixth-grade children with trained professionals in the use of an automated external defibrillator
- Development and Evaluation of a Just-in-Time Support System

Lecture 14

- Patient informatics
- Low heath literacy: what do your patients really understand
- A needs assessment for patient safety education: focusing on the nursing perspective

- The Impact of Inaccurate Internet Health Information in a Secondary School Learning Environment

Lecture 15
No readings

Lecture 16
No readings

Lecture 17
- Electronic health records
- It ain't necessarily so: the electronic health record and the unlikely prospect of reducing health care costs
- Consumer health informatics
- Systematic review: Impact of health information technology on quality, efficiency and cost of medical care
- Human-centered computing in health information systems

Lecture 18
- Virtual reality in surgery
- High fidelity medical simulation in the difficult environment of a helicopter: feasibility, self-efficacy and cost

Lecture 19
- Preventing medication errors: quality chasm (executive summary)
- Improving patient safety by identifying side effects from introducing bar coding in medication administration
- Role of computerized physician order entry systems in facilitating medication errors

Lecture 20
- Electronic prescribing
- Technology induced error and usability: the relationship between usability problems and prescription errors when using a handheld application
- Evaluation of drug label designs using eye tracking

Lecture 21
- Using telemedicine to conduct behavioral assessments
- Telemedicine
- The tele-health promise

Lecture 22
No readings

Lecture 23
- Human factors and safety in surgery
- Wrong site surgery
- Ergonomics in medicine and surgery

Lecture 24
- Macro-ergonomics in quality of care and patient safety

Lecture 25
- Patient safety in trauma care
- Human factors and ergonomics in the emergency department
- Human factors field study of equipment and process design and medication safety (abstract)

Lecture 26

- Ergonomic evaluation of the ambulance interior to reduce paramedic discomfort and posture stress
- Virtual reality and tele-presence for military medicine